# String Matching dengan Regular Expression

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Referensi:

Chapter 2 of *An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition,* by Daniel Jurafsky and James H. Martin

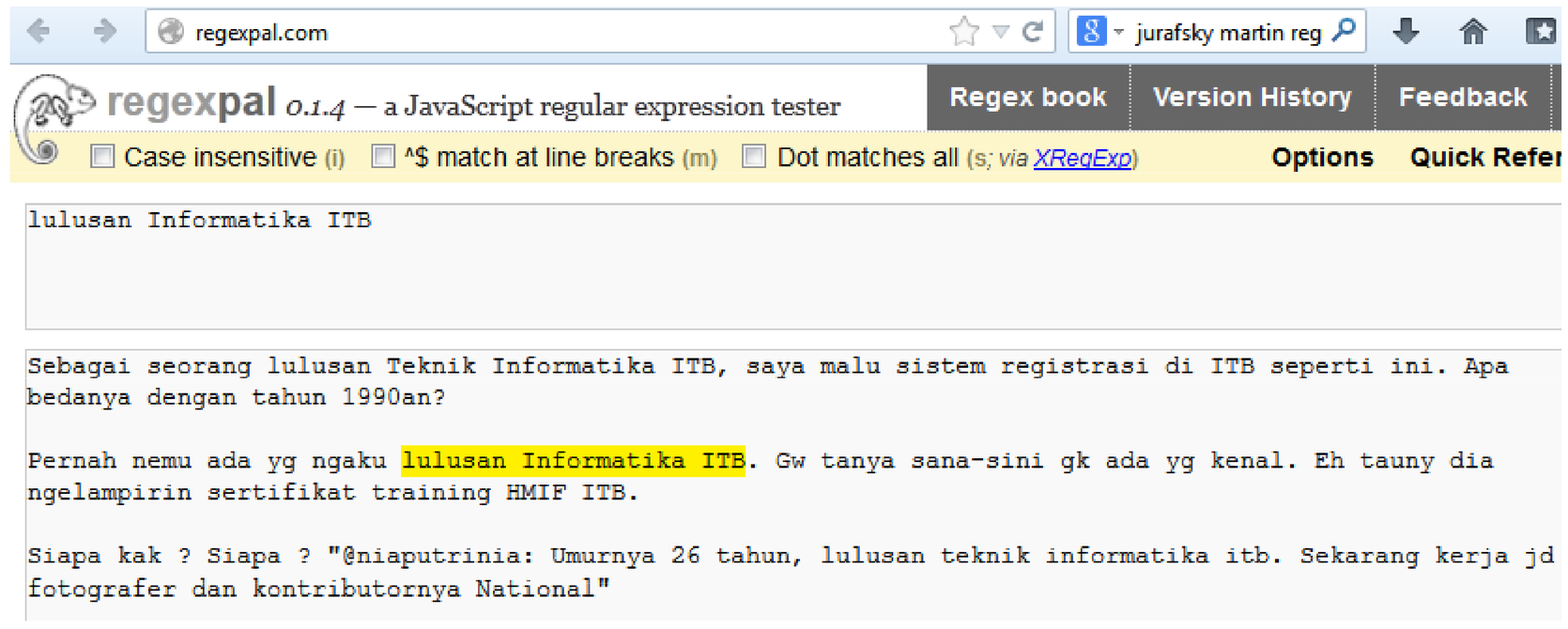
15-211 Fundamental Data Structures and Algorithms, by Ananda Gunawardena

## String Matching: Definisi

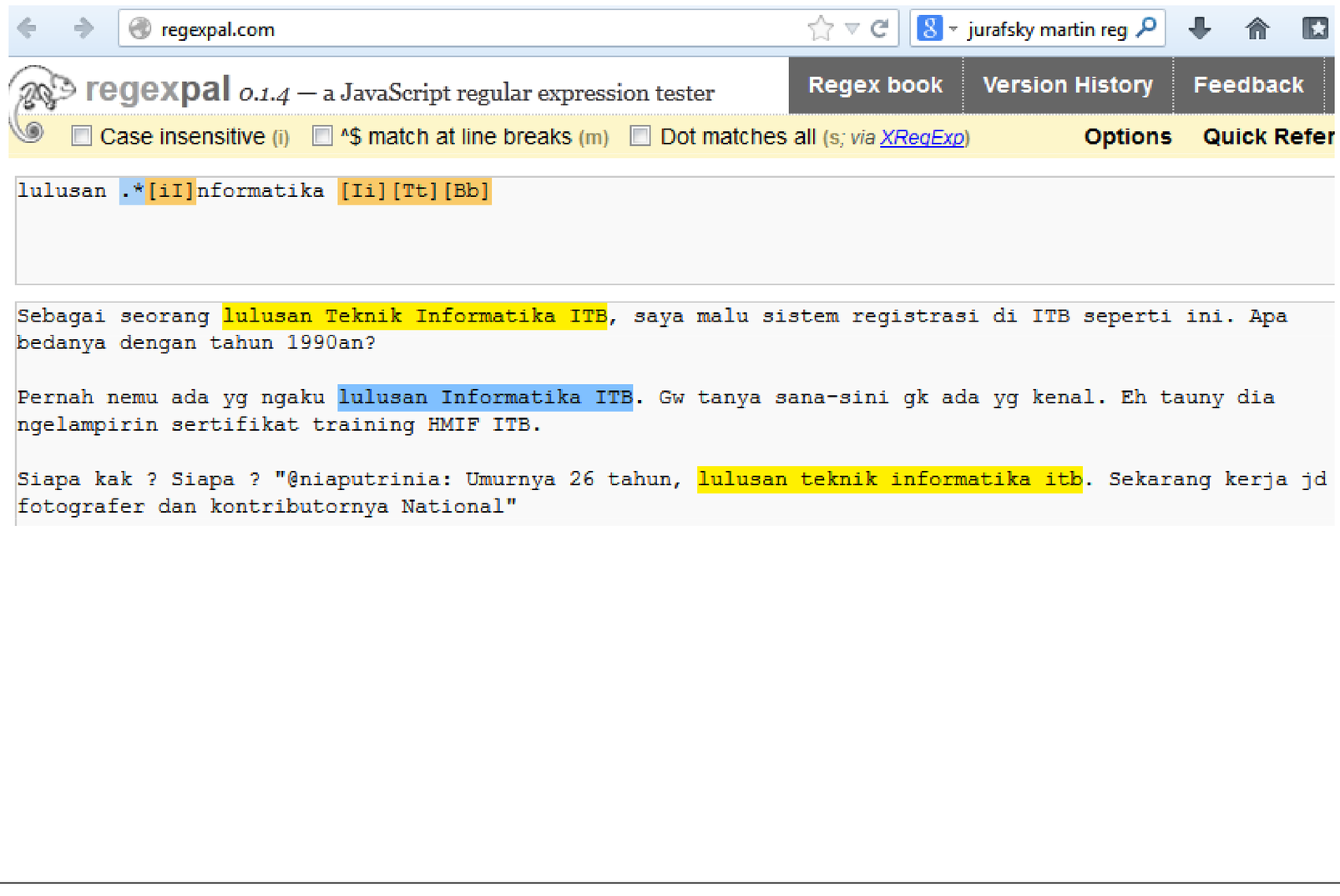
- Diberikan:
  1. *T*: teks (*text*), yaitu (*long*) *string* yang panjangnya *n* karakter
  2. *P: pattern*, yaitu *string* dengan panjang *m* karakter (asumsi *m* <<< *n*) yang akan dicari di dalam teks.

  Carilah (*find* atau *locate*) lokasi pertama di dalam teks yang bersesuaian dengan *pattern*.

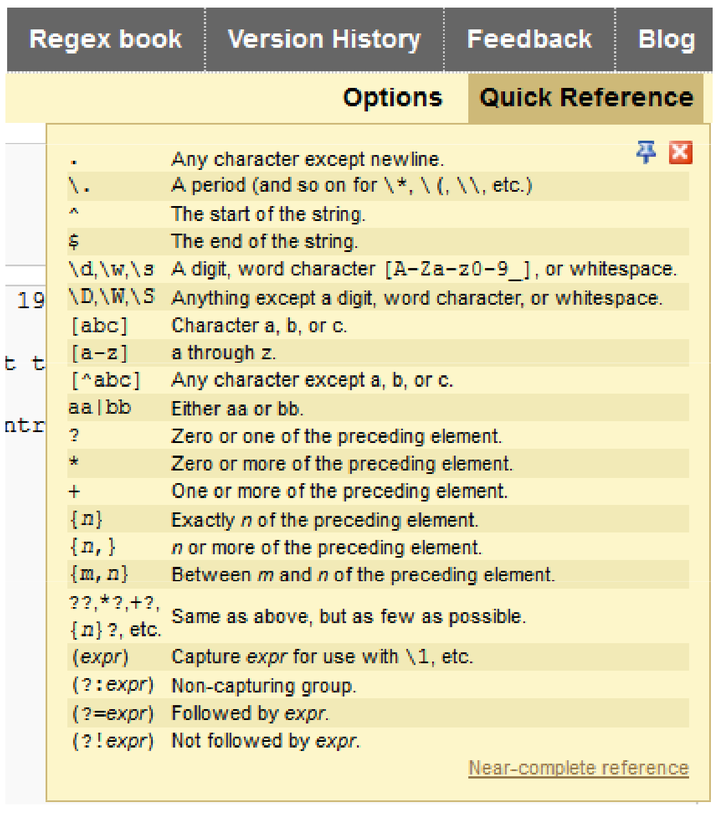
# String Matching : Contoh 1



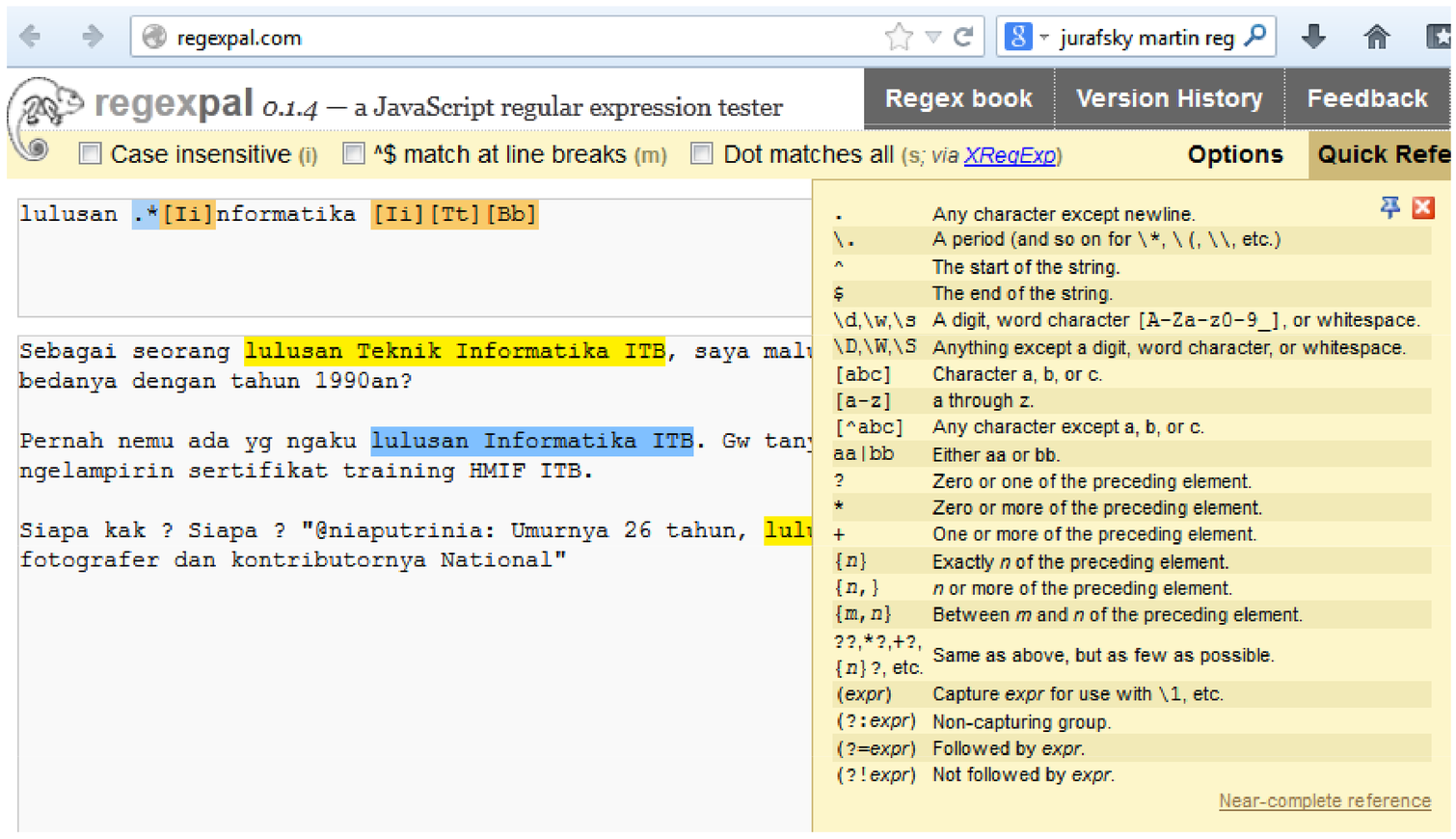

# String Matching : Contoh 2



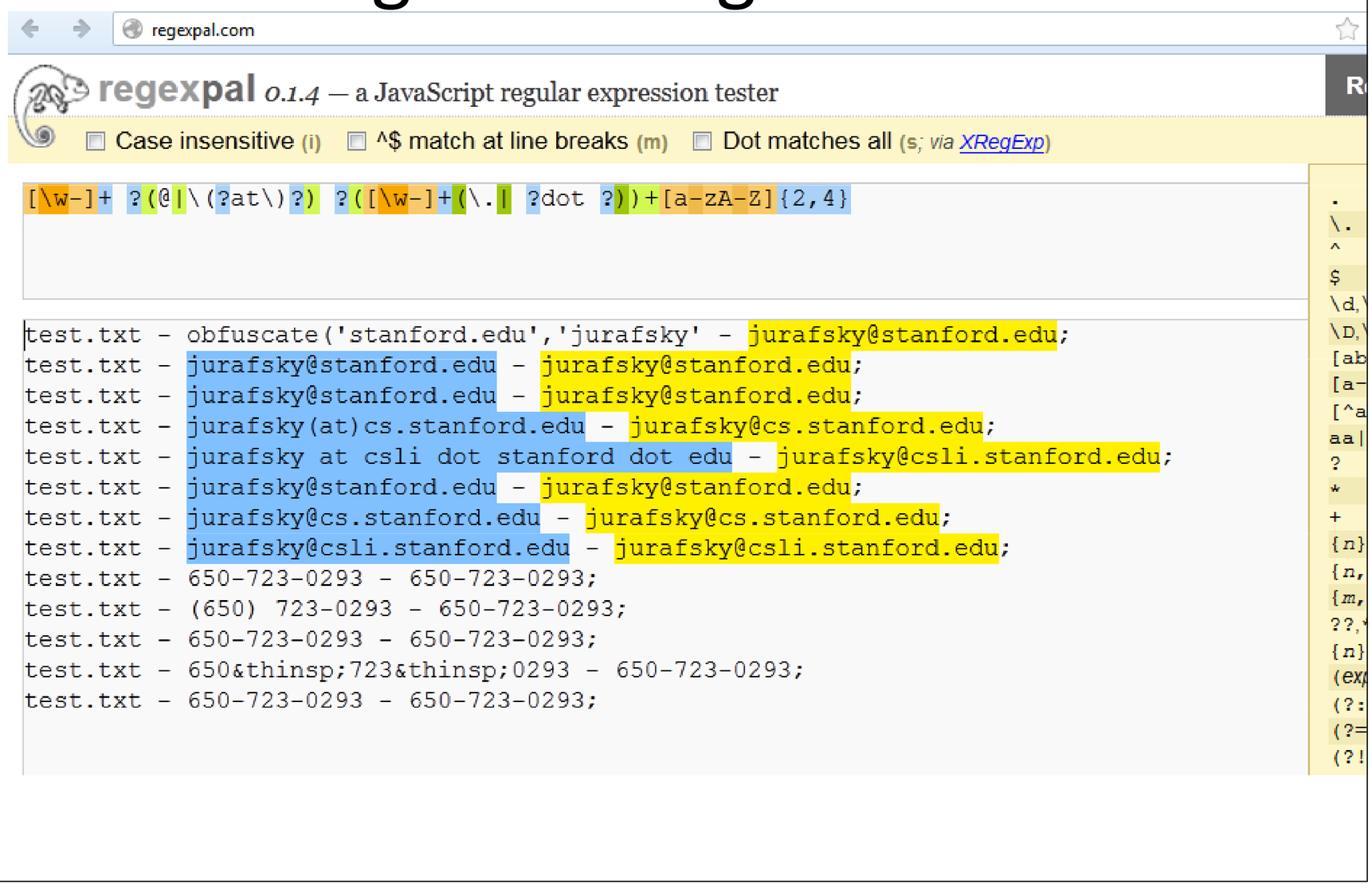
# Notasi Umum Regex



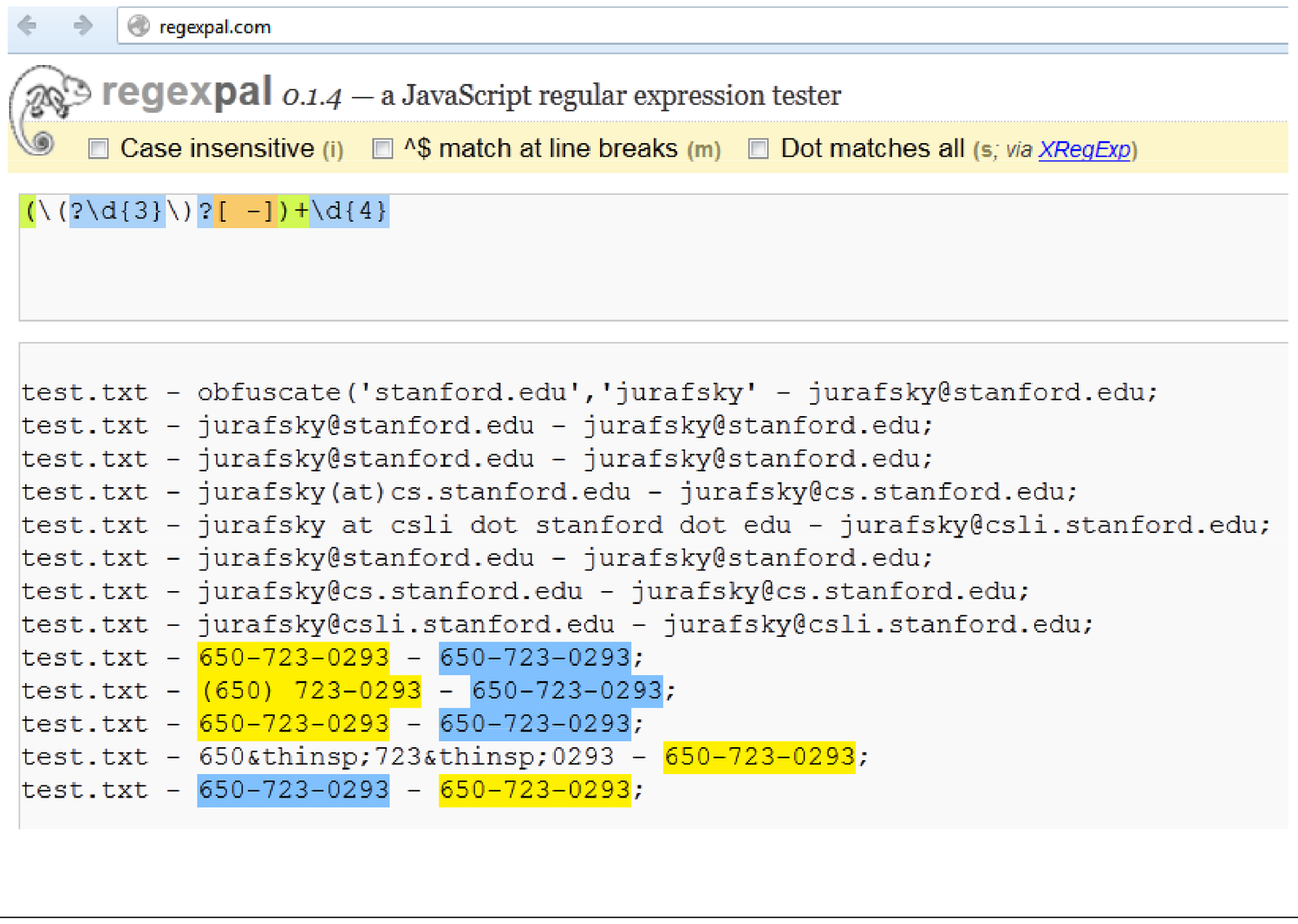

# String Matching : Contoh 2



# String Matching : Contoh 3




# String Matching : Contoh 4



## Basic Regular Expression Patterns

- The use of the brackets `[ ]` to specify a disjunction of characters.

| RE | Match | Example Patterns |
|---|---|---|
| `/ [wW]oodchuck/` | Woodchuck or woodchuck | "Woodchuck" |
| `/ [abc] /` | 'a', 'b', *or* 'c' | "In uomini, in soldati" |
| `/ [1234567890] /` | any digit | "plenty of 7 to 5" |

- The use of the brackets `[ ]` plus the dash – to specify a range.

| RE | Match | Example Patterns Matched |
|---|---|---|
| `/ [A-Z] /` | an uppercase letter | "we should call it 'Drenched Blossoms'" |
| `/ [a-z] /` | a lowercase letter | "my beans were impatient to be hoed!" |
| `/ [0-9] /` | a single digit | "Chapter 1: Down the Rabbit Hole" |



## Basic Regular Expression Patterns

- Uses of the caret `^` for negation or just to mean `^`

| RE | Match (single characters) | Example Patterns Matched |
|---|---|---|
| `[^A-Z]` | not an uppercase letter | "Oyfn pripetchik" |
| `[^Ss]` | neither 'S' nor 's' | "I have no exquisite reason for't" |
| `[^\.]` | not a period | "our resident Djinn" |
| `[e^]` | either 'e' or '^' | "look up ^ now" |
| `a^b` | the pattern 'a^b' | "look up a^ b now" |

- The question-mark `?` marks optionality of the previous expression.

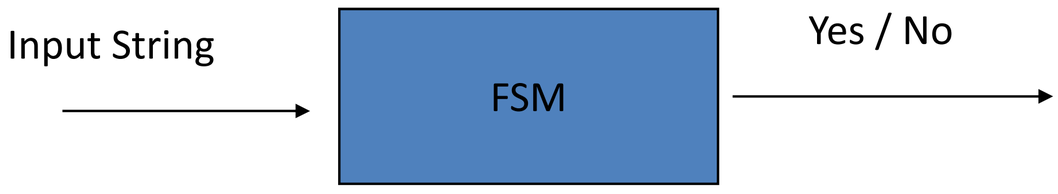
| RE | Match | Example Patterns Matched |
|---|---|---|
| `woodchucks?` | woodchuck or woodchucks | "woodchuck" |
| `colou?r` | color or colour | "colour" |

- The use of period `.` to specify any character

| RE | Match | Example Patterns |
|---|---|---|
| `/beg.n/` | any character between *beg* and *n* | begin, beg'n, begun |

# Finite State Machines (FSM)

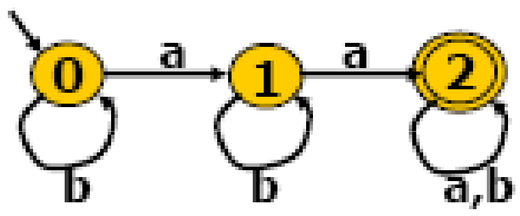
- FSM is a computing machine that takes
  - A string as an input
  - Outputs YES/NO answer
    - That is, the machine “accepts” or “rejects” the string




Referensi: Gunawardena, 2006

# FSM Model

- Input to a FSM
  - Strings built from a fixed alphabet {a,b,c}
  - Possible inputs: aa, aabbcc, a  etc..
- The Machine
  - A directed graph
    - Nodes = States of the machine
    - Edges = Transition from one state to another

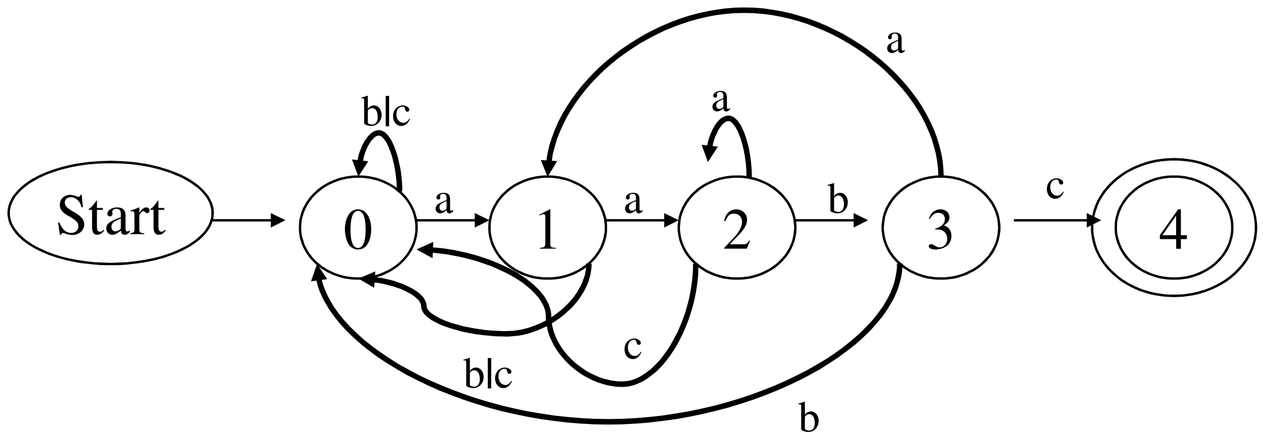



- Special States
  - Start (q0)  and Final (or Accepting) (q2)
- Assume the alphabet is {a,b}
  - Which strings are accepted by this FSM?

Referensi: Gunawardena, 2006

# FSM untuk String Matching

- Alphabet {a,b,c}
- Pattern “aabc”
- String: aaaaaaaaaaaabcddddddddddddddd




Referensi: Gunawardena, 2006